

Improved Classification with the Cavex® DE Hydrocyclone for Mill Circuit, Coarse Particle Flotation, and Tailings Applications

J. J. Hanhineni¹, J. Heo², N. Weerasekara³, E. Wang⁴, H. Thanasekaran⁵, A. Kilcullen⁶

1. Director of Engineering, Weir Minerals, Brisbane Queensland.
Email: Jeremy.hanhineni@mail.weir
2. Process Engineer, Weir Minerals, Brisbane Queensland.
Email: jun.heo@mail.weir
3. Principal Engineer, Weir Minerals, Sydney New South Wales.
Email: nirmal.weerasekara@mail.weir
4. Process Engineer, Weir Minerals, Perth Western Australia.
Email: echo.wang@mail.weir
5. Flotation Process Engineer, Eriez Flotation Division, Melbourne Victoria.
Email: homiet@eriez.com
6. Weir Minerals Technical Centre Manager, Weir Minerals, Melbourne Victoria.
Email: adam.kilcullen@mail.weir

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ABSTRACT

The Cavex® DE hydrocyclone is presented, which incorporates two stages of separation in a single device with no intermediate pumping. Design updates which have further improved the Cavex® DE design for use in coarser feed applications, like in mill circuit and Coarse Particle Flotation (CPF) are presented. Experimental test campaign results are presented, which show the Cavex® DE can replace a two hydrocyclone cluster system for CPF. Comparisons of classification performance between the Cavex® DE and a single stage hydrocyclone at a copper-gold operation in Queensland are presented, and existing operational data in a grinding circuit with CPF in Chile is provided. A modelling technique to support selection and optimisation of the Cavex® DE, for firstly CPF and mill circuit, and secondly for tailings applications, is also presented. Advanced techniques used in optimising the design are described, including multi-phase Computational Fluid Dynamics (CFD) with Lagrangian and Eulerian approaches for coarse and fine particle tracing respectively. CFD modelling was first validated using industrial scale tests, and then used in optimising designs. To quantify the benefits in mill circuit, a case study simulation is presented showing the throughput, energy, and sustainability improvements available with Cavex® DE technology. Finally, a review of the historic utilisation of Cavex® DE technology, and also new industrial scale test results and optimisation, for tailings applications will be presented. The effective generation of separate slimes and sand streams with high recovery will be presented, supporting the beneficial use of tailings in wall construction. The flexibility inherent in Cavex® DE technology, with its array of interchangeable options and configurations, provides the industry with an adaptable high performing classifier in the various applications listed above. This paper presents guidance for, and enhancements in the methodology for the optimisation of its configuration and selection. The test results and operational data presented show the benefits in performance available to the industry in these applications.

Note to reviewers: approval is being sought from currently anonymised sites, so site details can also be provided in the paper.